ST-313L

AEP Model
UK Model

FM-AM PROGRAM TUNER

SPECIFICATIONS

GENERAL

System: FM stereo, FM/AM superheterodyne tuner

Power Requirements: 220 V ac (120 or 240 V ac adjustable), 50 Hz (AEP model)
240 V ac, 50 Hz (UK model)

Power Consumption: 18 W

Dimensions: Approx. 410 (w) x 145 (h) x 277 (d) mm
16⅛ (w) x 5¾ (h) x 10⅞ (d) inches
including projecting parts and controls

Weight: Approx. 4.9 kg, 10 lb 13 oz (net)
5.8 kg, 12 lb 13 oz (in shipping carton)

FM TUNER SECTION

Frequency Range: 87.5–108 MHz

Antenna: 300 Ω balanced
75 Ω unbalanced

Intermediate Frequency: 10.7 MHz

Sensitivity at 46 dB Quieting: (40 kHz deviation) 17.3 dBf, 4 μV (MONO)
39.2 dBf, 50 μV (STEREO)

Usable Sensitivity: 1.6 μV, S/N = 26 dB
(40 kHz deviation)

S/N Ratio: 75 dB (MONO)
70 dB (STEREO)

Harmonic Distortion: (40 kHz deviation)
at 100 Hz
0.15 % (MONO)
0.25 % (STEREO)
at 1 kHz
0.15 % (MONO)
0.25 % (STEREO)
at 10 kHz
0.2 % (MONO)
0.5 % (STEREO)

IM Distortion: (40 kHz deviation)
0.15 % (MONO)
0.25 % (STEREO)

Separation:
35 dB at 100 Hz
45 dB at 1 kHz
35 dB at 10 kHz

Frequency Response: 40 Hz–12.5 kHz $^{+0.5}_{-1.0}$ dB

Selectivity: 40 dB at 300 kHz

Capture Ratio: 1.0 dB

AM Suppression Ratio: 54 dB

Image Response Ratio: 45 dB

IF Response Ratio: 90 dB

Spurious Response Ratio: 75 dB

RF Intermodulation: 60 dB

Sub-carrier Product Ratio: 35 dB

Output Level/Impedance: 450 mV, 6.8 kΩ at 1 kHz
deviation, 100 % modulation

SW/MW/LW TUNER SECTION

	SW	MW	LW
Frequency Range	5.8–15.8 MHz	530–1,605 kHz	150–350 kHz
Antenna	Attached antenna wire		Built-in ferrite rod antenna
	External antenna terminal		External antenna terminal
Intermediate Frequency	468 kHz		
Usable Sensitivity	30 μV (29.5 dB), external antenna, at 10 MHz	100 μV (40 dB), external antenna, at 1,000 kHz	500 μV/m (54db/m), built-in antenna, at 250 kHz 100 μV (40 dB), external antenna, at 250 kHz
S/N Ratio	52 dB at 5 mV	52 dB at 5 mV	52 dB at 50 mV/m
Harmonic Distortion	0.3 % at 5 mV, 400 Hz		0.3 % at 50 mV/m 400 Hz
Selectivity	28 dB at 9 kHz, 30 dB at 10 kHz		
Image Response Ratio	——	40 dB at 1,000 kHz	65 dB at 250 kHz
IF Response Ratio	——	70 dB at 1,000 kHz	70 dB at 250 kHz

MODEL IDENTIFICATION

– Specification Label –

AEP model

SONY

FM-AM PROGRAM TUNER
MODEL No. **ST-313L**
FREQ. RANGE: FM 87.5 – 108 MHz
SW 5.8 – 15.8 MHz
MW 530 – 1605 kHz
LW 150 – 350 kHz
IF: FM 10.7 MHz
AM 468 kHz
AC: 220 V ~ 50 Hz 18 W
MADE IN JAPAN
SERIAL NO.

UK model

SONY

FM-AM PROGRAM TUNER
MODEL No. **ST-313L**
FREQ. RANGE: FM 87.5 – 108 MHz
SW 5.8 – 15.8 MHz
MW 530 – 1605 kHz
LW 150 – 350 kHz
IF: FM 10.7 MHz
AM 468 kHz
AC 240 V ~ 50 Hz 18 W
MADE IN JAPAN
SERIAL NO.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS, EXPLODED VIEWS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

– Continued on page 2 –

SONY®
SERVICE MANUAL

SECTION 1
OUTLINE

1-1. CIRCUIT DESCRIPTION (See Fig. 1)

Program Sensor

When PROGRAM SENSOR switch (S1) turns on and the pointer matches with a station marker, FM or LW station is automatically selected through optical detection. (Fig. 2).

When the pointer matches only with the FM marker:

The Light of IC501 (Photo Interrupter) is intercepted by the marker, bias voltage is applied to the base of Q501 through R501, and Q501 is turned on.
→ The collecter voltage of Q501 reduces and D503 is turned on.
→ The terminal (23) of IC201 is grounded through D201, R254, R515, D503, Q501 and D501.
→ FM circuit operates (The terminal (23) of IC201 serves as a switch.)

Note: When B+ voltage is applied to the terminal (23) of IC201 through R252, R254 and D201, the receiver is in LW mode. At the same time, as Q503 is on, PL704 (FM indicator lamp) lights. When B+ voltage is not applied, it is in fm mode.

When the pointer matches only with the LW station marker:

As the light of IC501 is not intercepted, Q501 and D503 are turned off. As a result, B+ voltage is applied to the terminal (23) of IC201 through R252 and R254. On the other hand, the light of IC502 is intercepted by the LW station marker. → Q502 and Q504 are turned on.
→ B+ voltage is applied to L253 (LW oscillator coil).
→ LW circuit operates. When Q504 is on, PL705 (LW indicator lamp) simultaneously lights.

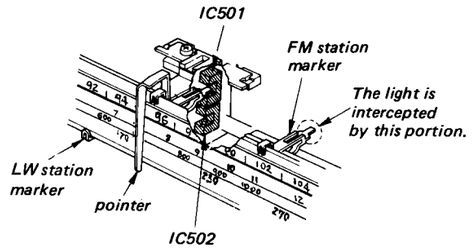


Fig. 2

When the pointer matches simultaneously with both the FM and LW station markers:

Q501 and Q503 are turned on by intercepting the light of IC501. On the other hand, the light of IC502 is also intercepted and the bias voltage is applied to the base of Q502, but because the collector voltage of Q503 is high, D502 is turned off. The emitter voltage of Q502 rises and Q502 is turned off. Therefore, Q504 is turned off and B+ voltage is not applied to L253 (LW oscillator coil) and PL705. Consequently, only the fm station signal is received.

Q505, 506

Q505 operates to improve the rise time of PL704 (FM indicator lamp) and PL705 (LW indicator lamp) when the station signal is tuned, and at the same time Q505 switches Q506. Q505 serves as a high-speed-muting switch which is turned on or off as soon as the station signal is tuned or detuned.

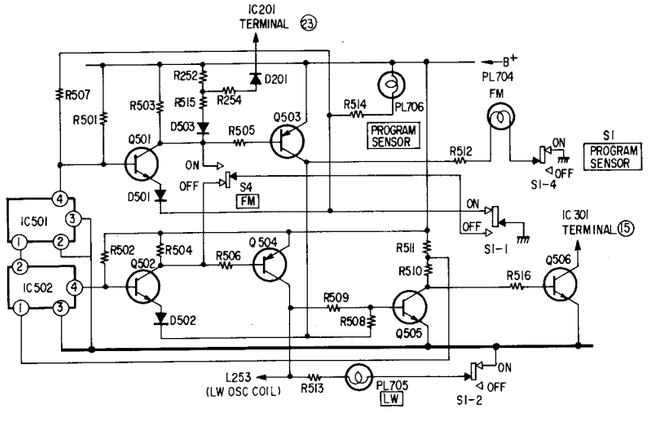


Fig. 1

IC201 (CX168), IC301 (CX178)

These two ICs form a system. Both of them are bipolar-linear-ICs. CX168 integrates 343 elements and CX178 integrates 260 elements. They include many functions and are improved upon the degree of integration now available as a linear-ICs for tuner use. They have high performance in FM reception and form a muting system having an FM muting attenuation of 90dB. In addition, because a muting circuit is newly employed in the AM circuit not only is there high performance in FM reception but LW station signal can be received with fine tone quality and sensitivity as with FM broadcasting station. As an additional function, they operate for FM/LW continuous station selection, FM/LW signal-strength meter output, FM/LW muting output switching and enforced AGC at FM reception.

CX168 Main Function

<FM>
- IF Amplifier
- Quadrature detector
- Signal-strength Meter Output
- Muting Signal Output
- AFC Output for Converter
- Multipath Signal Output
- Bandpass Control Circuit

<AM>
- RF Attenuator
- Mixer
- Oscillator
- IF Amplifier and AGC
- AM Detector
- Signal-strength Meter Output
- Signal Generator for AM Muting

<General>
- Regulator
- FM/AM Switching
- Regulator Output

CX178 Main Function

<FM Stereo Demodulator>
- FM Stereo Demodulator
- Phase Detector
- Stereo Indicating Circuit
- VCO
- VCO ON/OFF Circuit

<General>
- Muting Gate
- Regulator
- Muting Canceler Circuit
- Pop-noise Canceler
- Hysteresis Circuit

Photo Interrupter (IC501, 502)

The terminals (1) and (2) of the photo interrupter operates as the light emitting diode. On the other hand, the terminals (3) and (4) operates as the photo detector. When the photo detector receives the light as shown in Fig. 3, the terminal between terminals (3) and (4) is a low-impedance. When light is intercepted by the marker, as shown in Fig. 4, it becomes high-impedance.

When the photo detector receives the light:

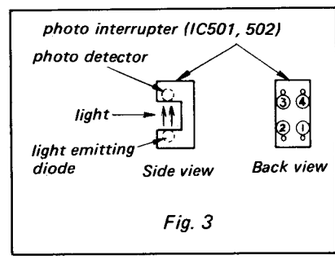


Fig. 3

When light is intercepted by the marker:

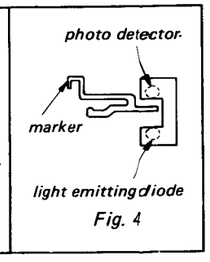
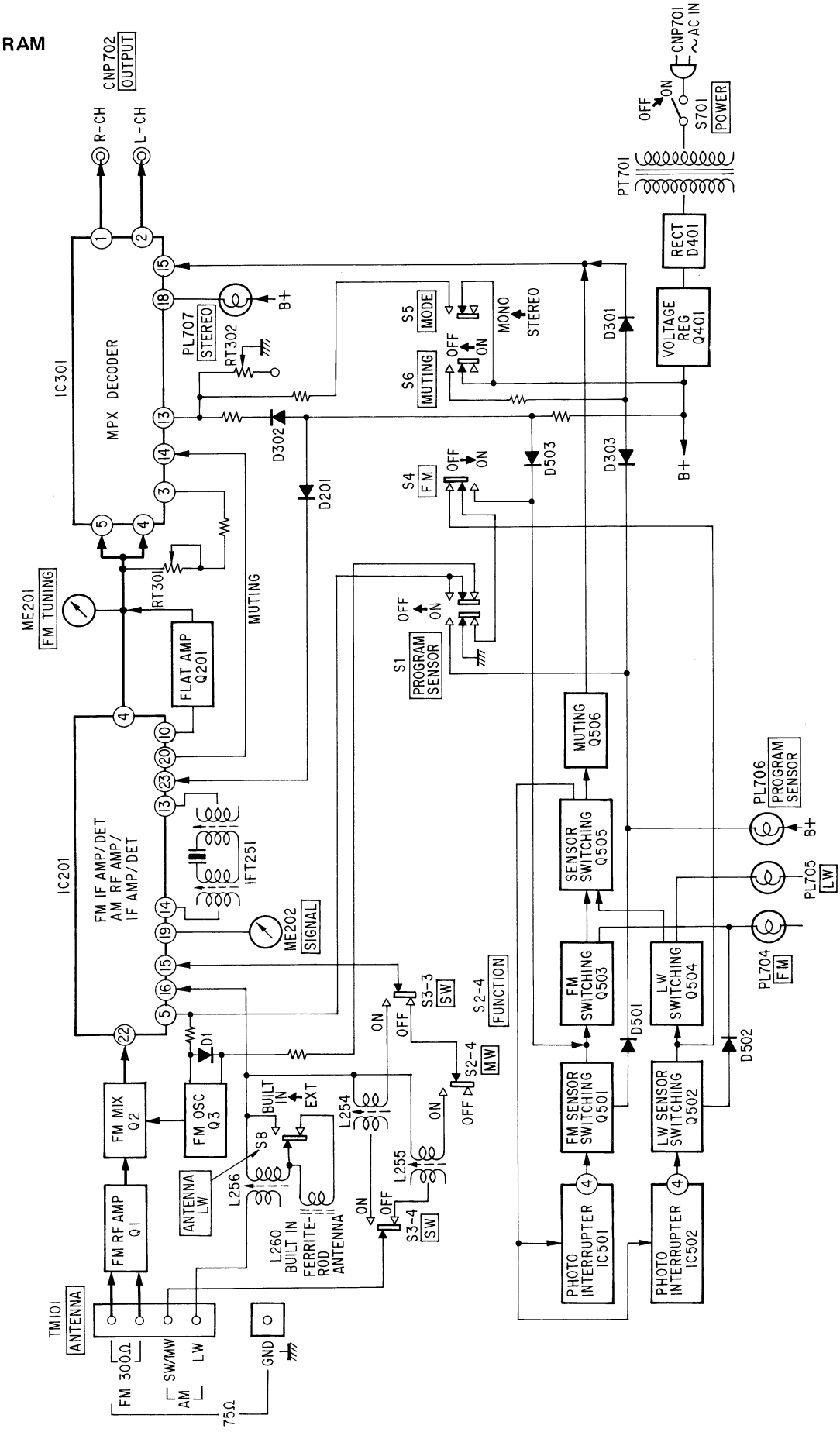


Fig. 4

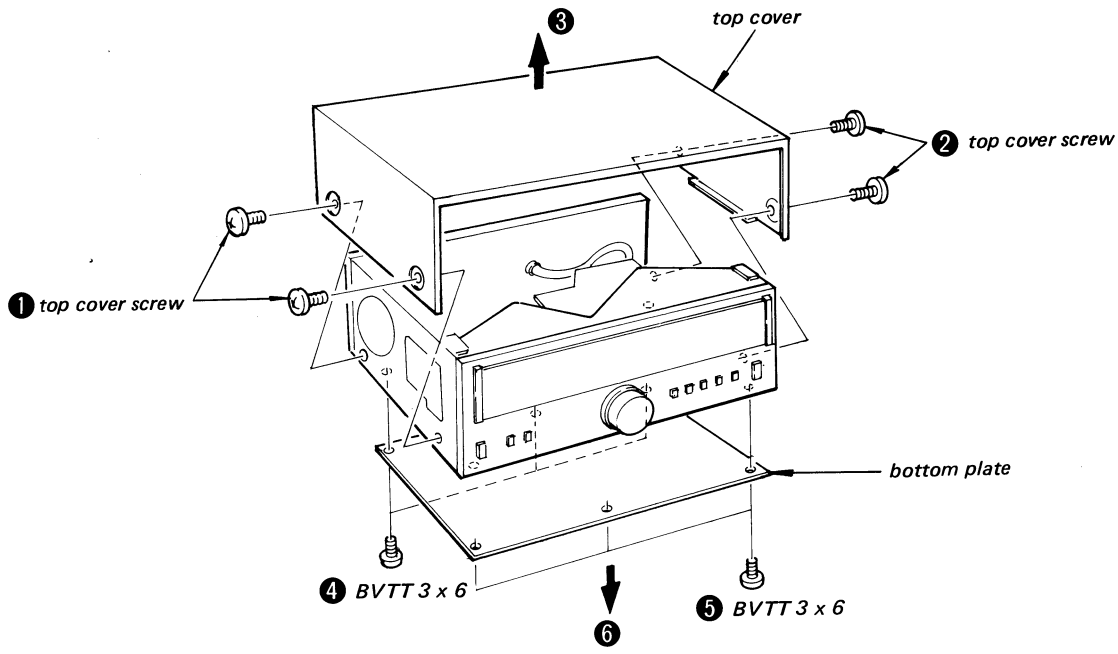
1-2. BLOCK DIAGRAM



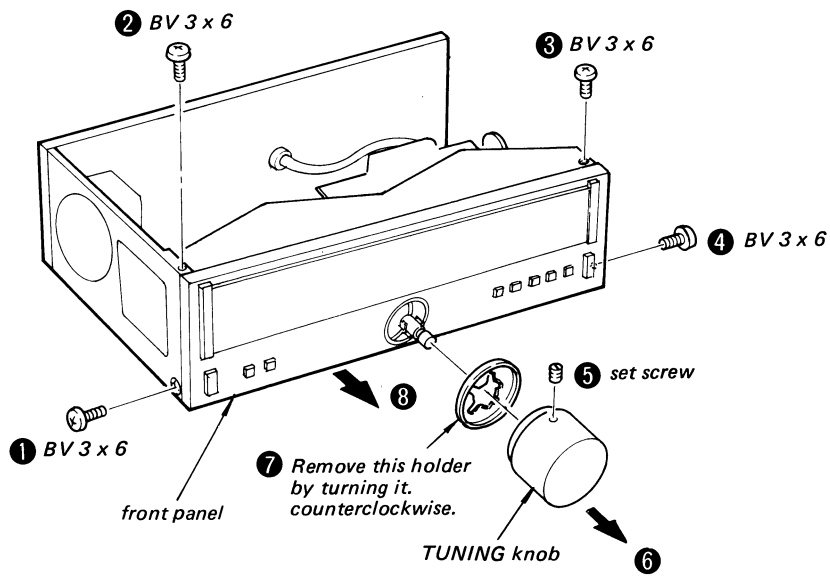
SECTION 2
DISASSEMBLY

- Follow the disassembly procedure in the numerical order given.

2-1. TOP COVER AND BOTTOM PLATE REMOVAL

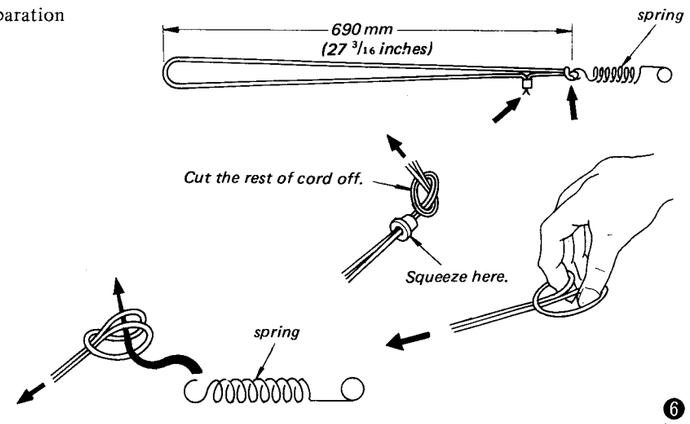


2-2. FRONT PANEL REMOVAL



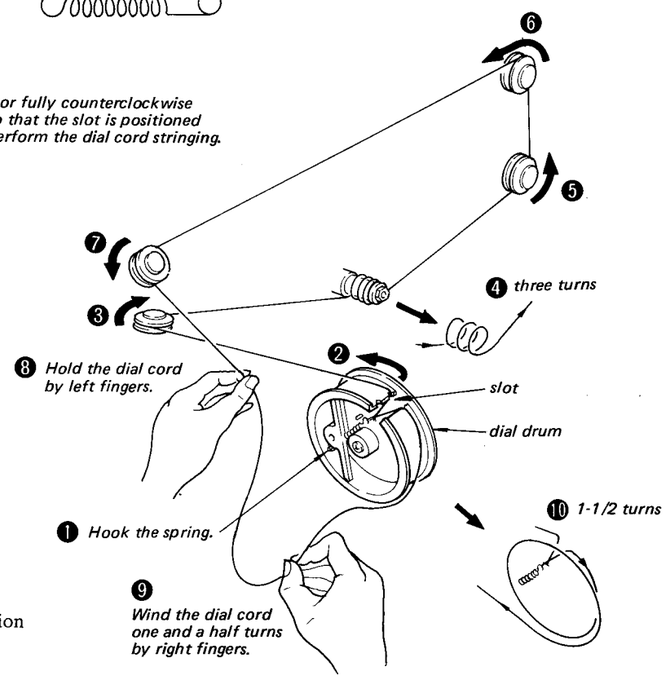
2-3. DIAL CORD STRINGING

1) Preparation

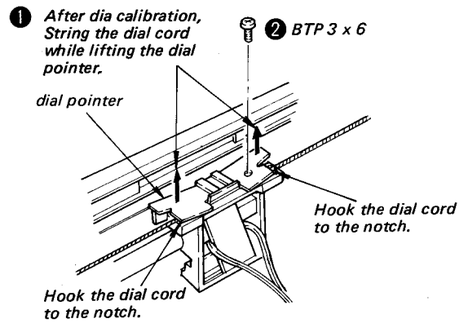


2) Stringing

Turn the tuning capacitor fully counterclockwise and set the dial drum so that the slot is positioned to the upper side and perform the dial cord stringing.



3) Dial Pointer Installation

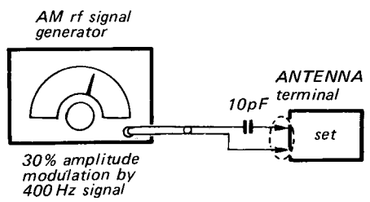

❶ After dia calibration, String the dial cord while lifting the dial pointer.
❷ BTP 3 x 6
dial pointer
Hook the dial cord to the notch.
Hook the dial cord to the notch.

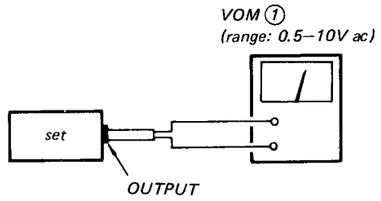
⓫ *After the dial cord stringing, perform the mechanical dial calibration by utilizing the off-the-air signals.*

MEMO

SECTION 3
ADJUSTMENTS

3-1. AM SECTION





- Repeat the procedures in each adjustment several times, and the frequency coverage and tracking adjustments should be finally done by the trimmer capacitors.

AM IF ALIGNMENT	
Adjust for maximum reading on VOM ① .	
IFT251	468 kHz

LW FREQUENCY COVERAGE ADJUSTMENT	
Adjust for maximum reading on VOM ① .	
145 kHz	L253
365 kHz	CT253

LW TRACKING ADJUSTMENT	
Adjust for maximum reading on VOM ① .	
L256	170 kHz
CT256	310 kHz

SW FREQUENCY COVERAGE ADJUSTMENT	
Adjust for maximum reading on VOM ① .	
CT251	16.1 MHz
L251	5.5 MHz

SW TRACKING ADJUSTMENT	
Adjust for maximum reading on VOM ① .	
15 MHz	CT254
6 MHz	L254

MW TRACKING ADJUSTMENT	
Adjust for maximum reading on VOM ① .	
L255	600 kHz
CT255	1,400 kHz

CT252	L252
1,680 kHz	520 kHz
Adjust for maximum reading on VOM ① .	
MW FREQUENCY COVERAGE ADJUSTMENT	

3-2. FM SECTION

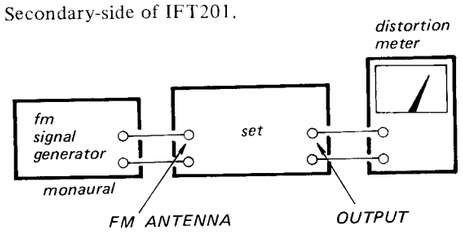
FM Frequency Coverage and Tracking Adjustment

Never attempt alignment of the fm front-end section for the fm frequency coverage and tracking adjustments. If the fm frequency coverage and tracking adjustments are required, consult the factory service center.

Discriminator Alignment

Procedure:

1. Secondary-side of IFT201.



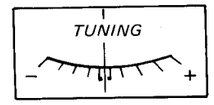
FM Signal Generator Setting:

Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100 %)
Output level: 1 mV (60 dB)

Procedure:

Tune the set to 98 MHz and adjust the secondary-side core (black) of IFT201 for minimum reading on the distortion meter.

2. Primary-side of IFT201
   1) Detune the set.
   2) Adjust the primary-side core (blue) of IFT201 for zero center on the TUNING meter.



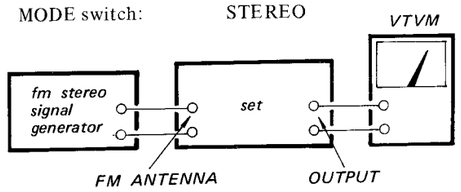
(Perform this procedure when replacing ceramic filter (CF201).)

3. Repeat the above steps 1 and 2 several times.

FM Stereo Separation Adjustment

Setup:

FUNCTION selector: FM
MODE switch: STEREO

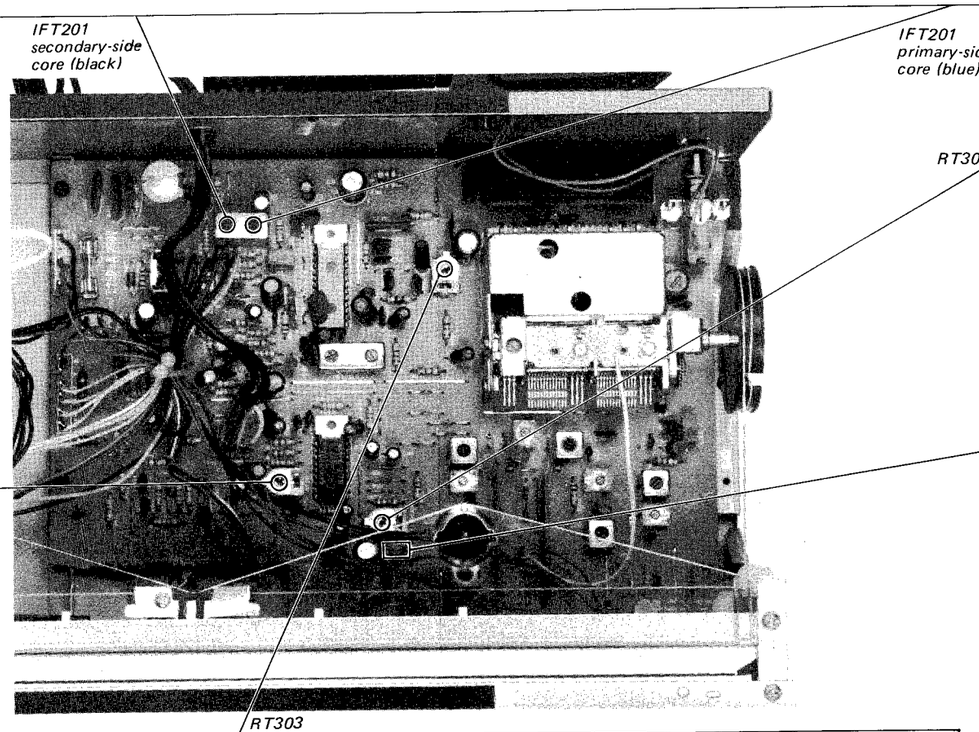


FM Stereo Signal Generator Setting:

Carrier frequency: 98 MHz
Output level: 1 mV (60 dB)
Mode: Stereo
Modulation:
Audio (400 Hz): 67.5 kHz deviation (90 %)
Pilot (19 kHz): 7.5 kHz deviation (10 %)
Sub channel (38 kHz): 67.5 kHz deviation (90 %)

FM stereo signal generator output channel	VTVM connection	VTVM reading
L-CH	L-CH	Ⓐ
R-CH	L-CH	Ⓑ Adjust RT301 for minimum reading.
R-CH	R-CH	Ⓒ
L-CH	R-CH	Ⓓ Adjust RT301 for minimum reading.

Readjust RT301 for minimum difference between left channel separation (Ⓐ – Ⓑ) and right channel separation (Ⓒ – Ⓓ).

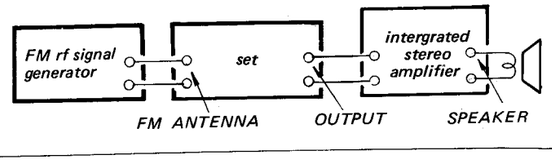


Muting Level Adjustment

Setting:

FUNCTION selector: FM
MUTING switch: ON

Procedure:



FM Signal Generator Setting:

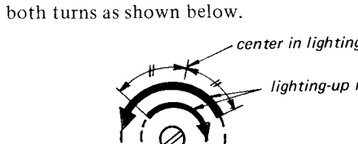
Carrier frequency: 98 MHz
Modulation: 400 Hz, 75 kHz deviation (100 %)

Procedure:

1. Set the output level of the fm signal generator to 6.3 μV (16 dB).
2. Adjust RT303 for the point where the sound can not be audible.

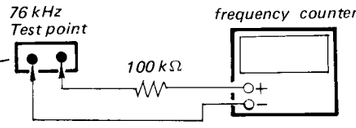
VCO(76kHz) Adjustment

A) Regular Method



FM Signal Generator Setting:

Carrier frequency: 98 MHz
Modulation: no modulation
Output level: 1 mV (60 dB)



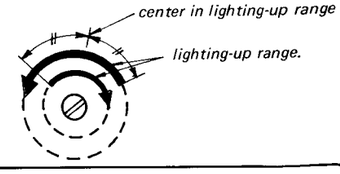
Procedure:

1. Tune the set to 98 MHz
2. Adjust RT302 for 76 kHz ± 100 Hz on the counter.

B) Simple Method

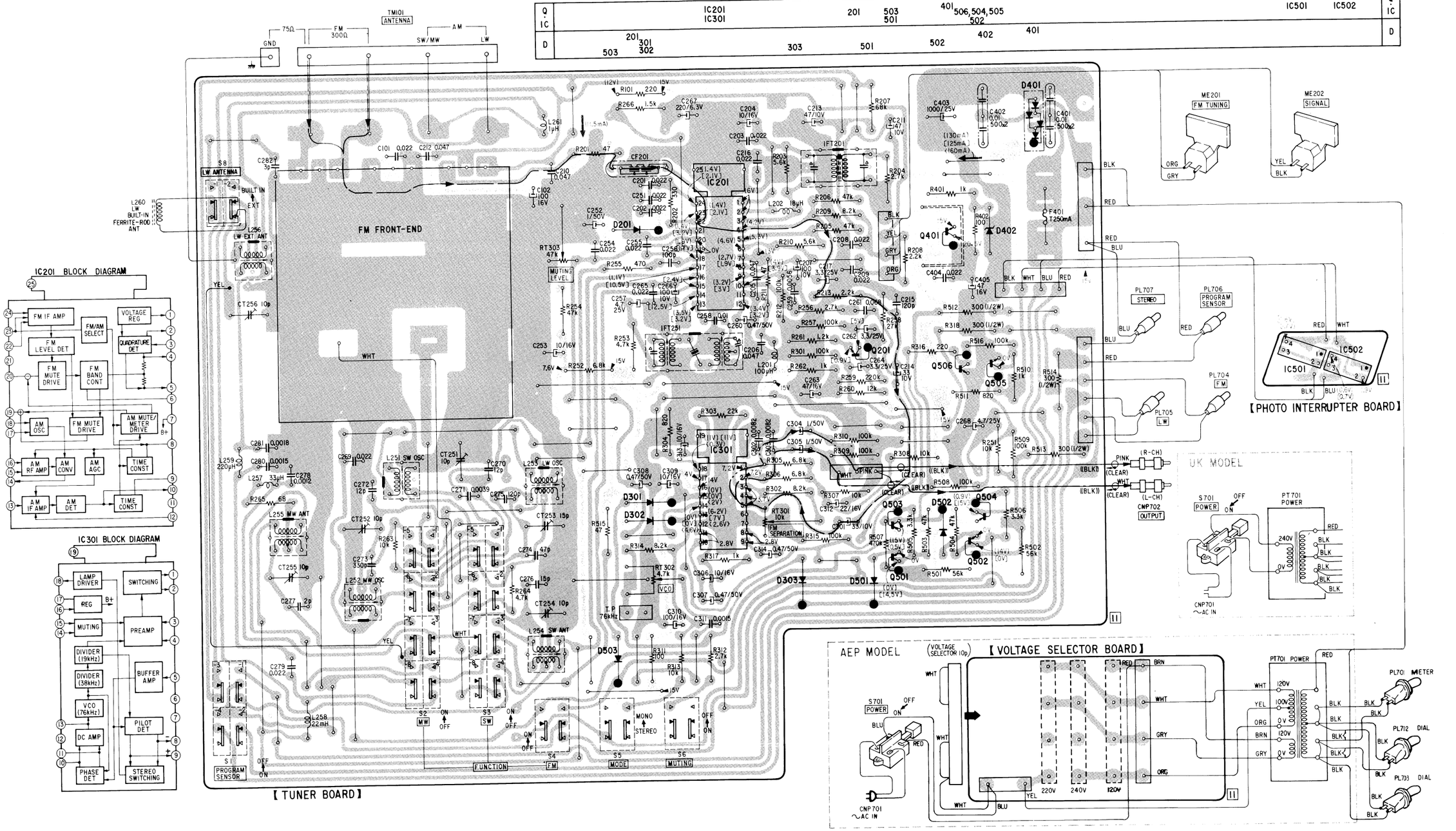
Procedure:

1. Tune the set to the FM stereo station signal.
2. Turn RT302 clockwise or counterclockwise and memorize the lighting-up range of STEREO lamp.
3. Secure RT302 at the center in lighting-up range of both turns as shown below.



SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM



Replacement Semiconductors

For replacement, use semiconductors except in ( ).

Q201, Q501,502, Q505,506 : 2SC1364 (2SC945)

Q401: 2SC1173

Q503, 504: 2SA678 (2SA844)

D201, D301–303, D501–503 : 1S1555 (1T40)

IC201: CX168

IC301: CX178

IC501,502: SPI201

D401: S1VB10

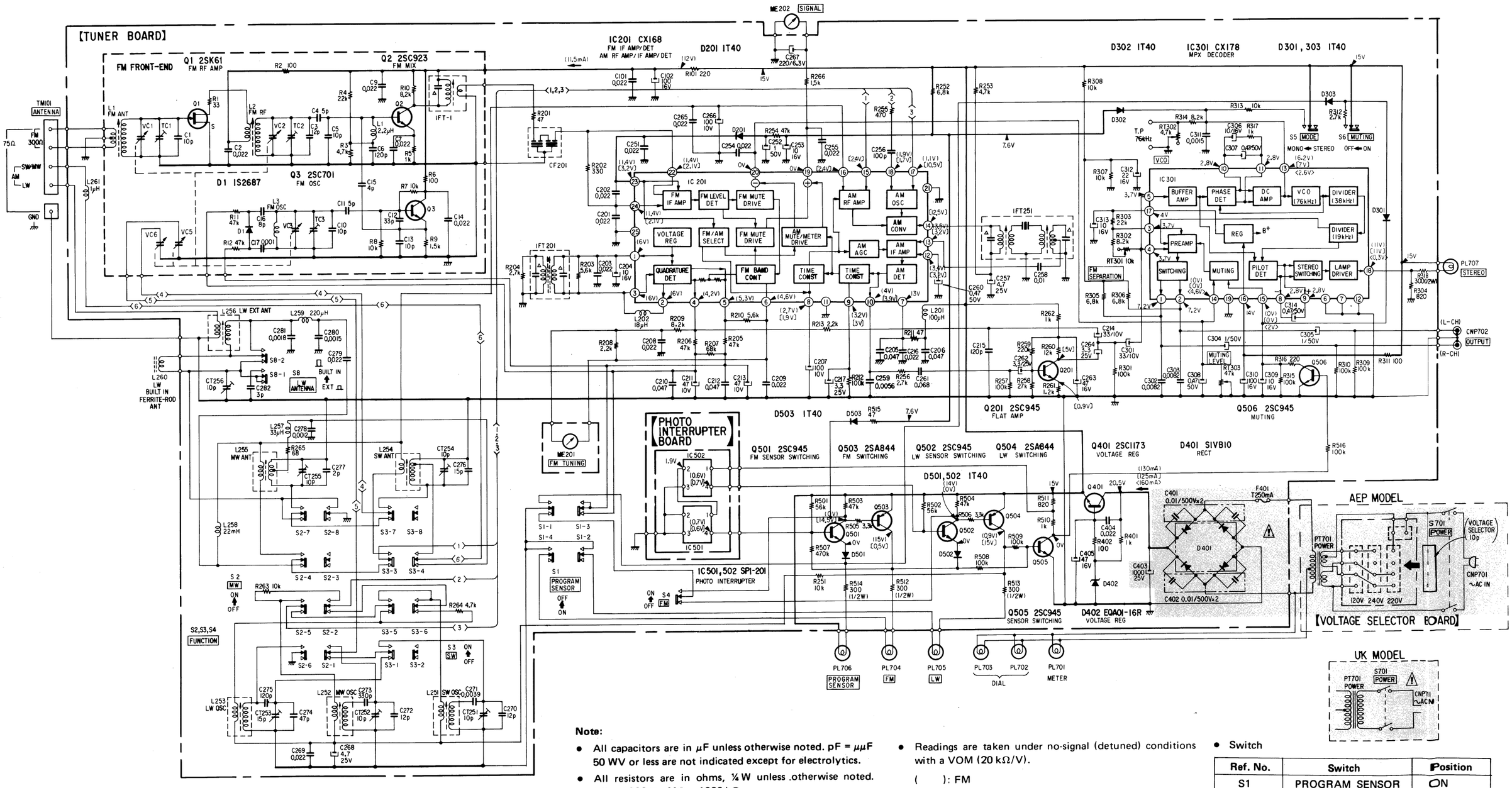
D402: EQB01-16 (EQA01-16R)

Note:

- ○— : parts extracted from the component side.
- ●— : parts extracted from the conductor side.
- ■ : part mounted on the conductor side.
- [ ]— : indicates side identified with part number.
- Color code of sleeving over the end of the jacket.
- (S + patter
- Signal Path
  - : FM
  - : L-CH
  - : R-CH

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

4-2. SCHEMATIC DIAGRAM



Note:

- All capacitors are in μF unless otherwise noted. pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ = 1000 Ω; MΩ = 1000 kΩ
- △ : internal component.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- ——: B+ bus.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal (detuned) conditions with a VOM (20 kΩ/V).

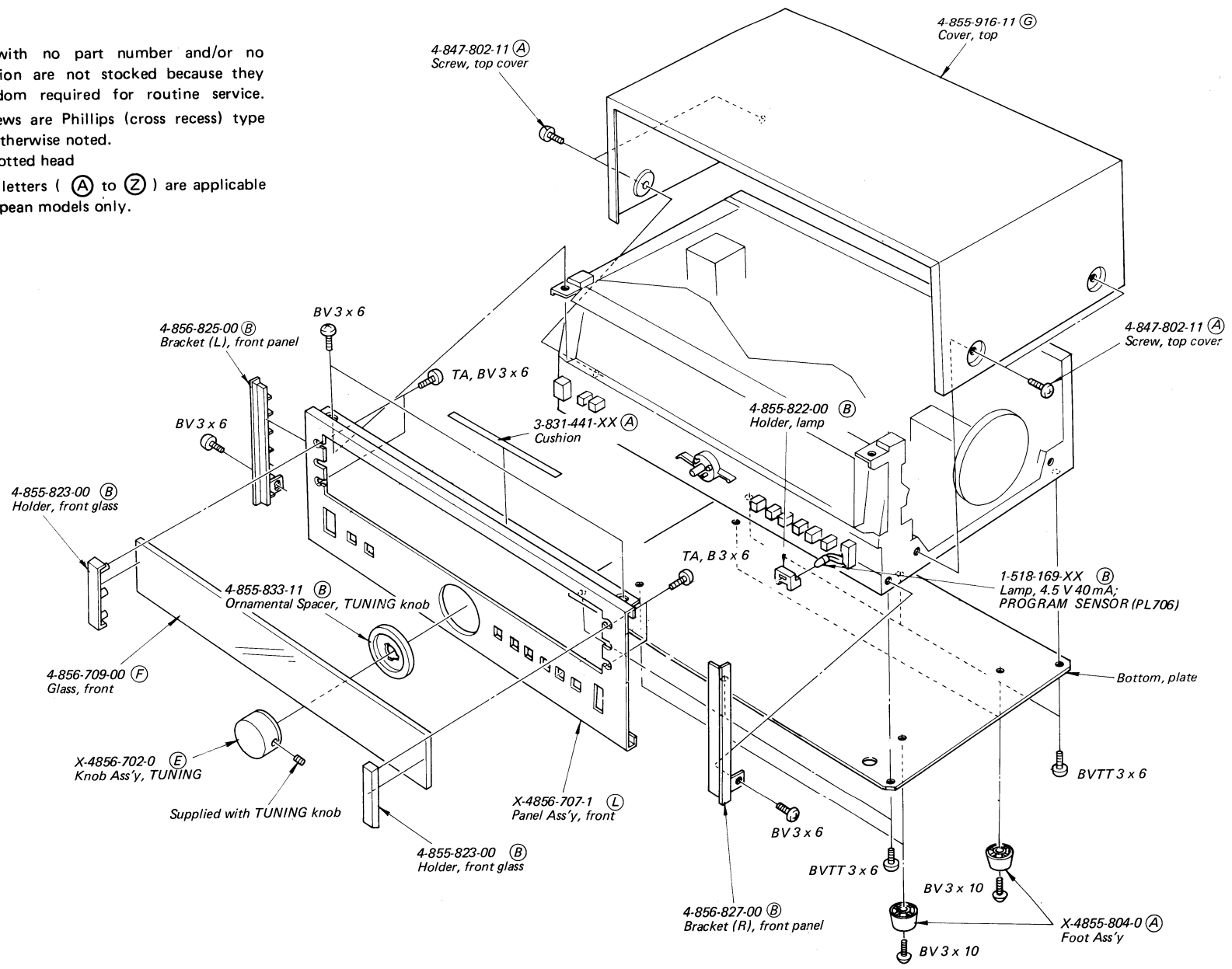
  ( ): FM
  [ ]: AM
  〈 〉: FM stereo
  nomark: common
- Switch

Ref. No.	Switch	Position
S1	PROGRAM SENSOR	ON
S2	FUNCTION-MW	OFF
S3	FUNCTION-SW	OFF
S4	FUNCTION-FM	OFF
S5	MODE	STEREO
S6	MUTING	ON
S8	LW ANTENNA	EXT
S701	POWER	OFF

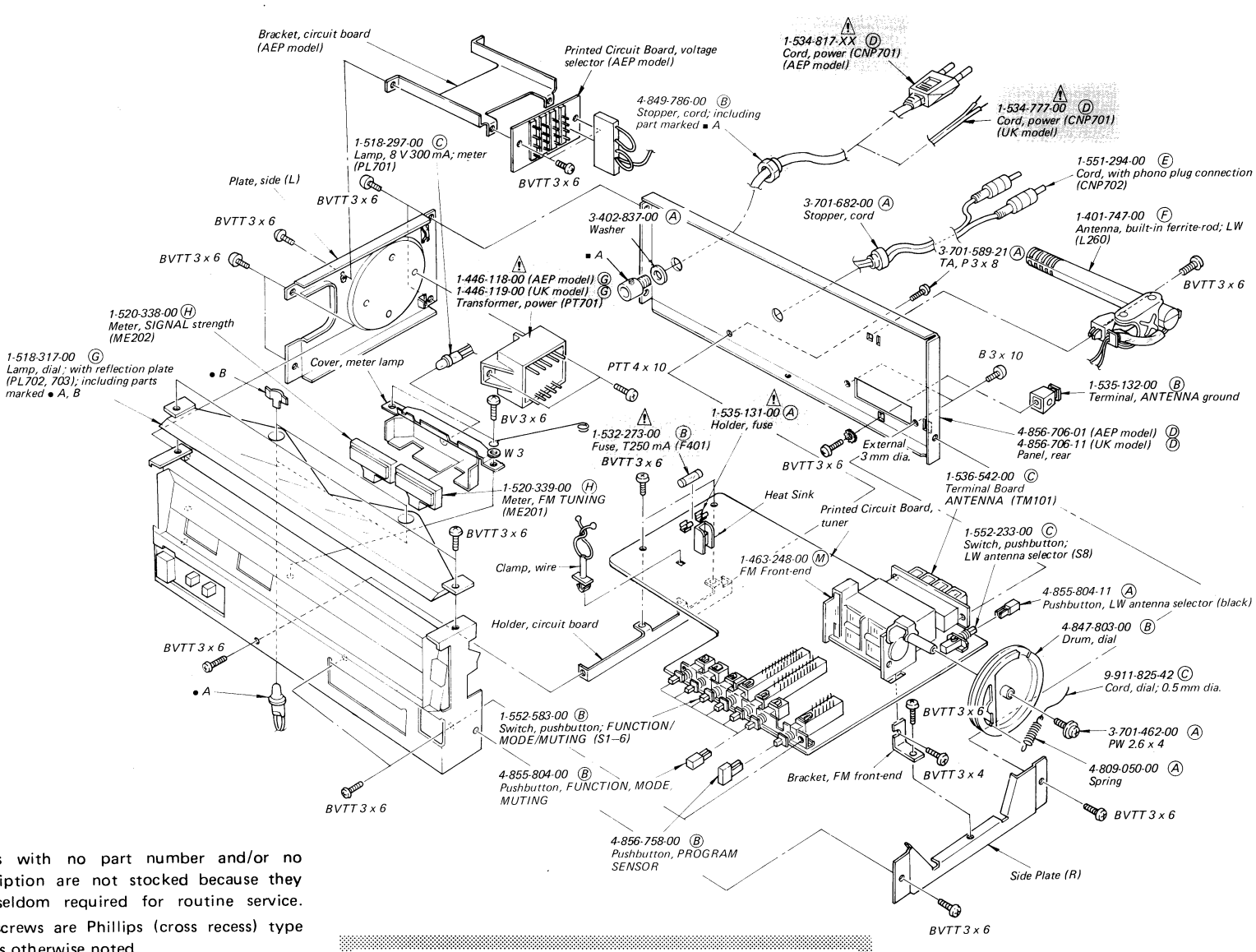
(1)

Note:

- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.



(2)



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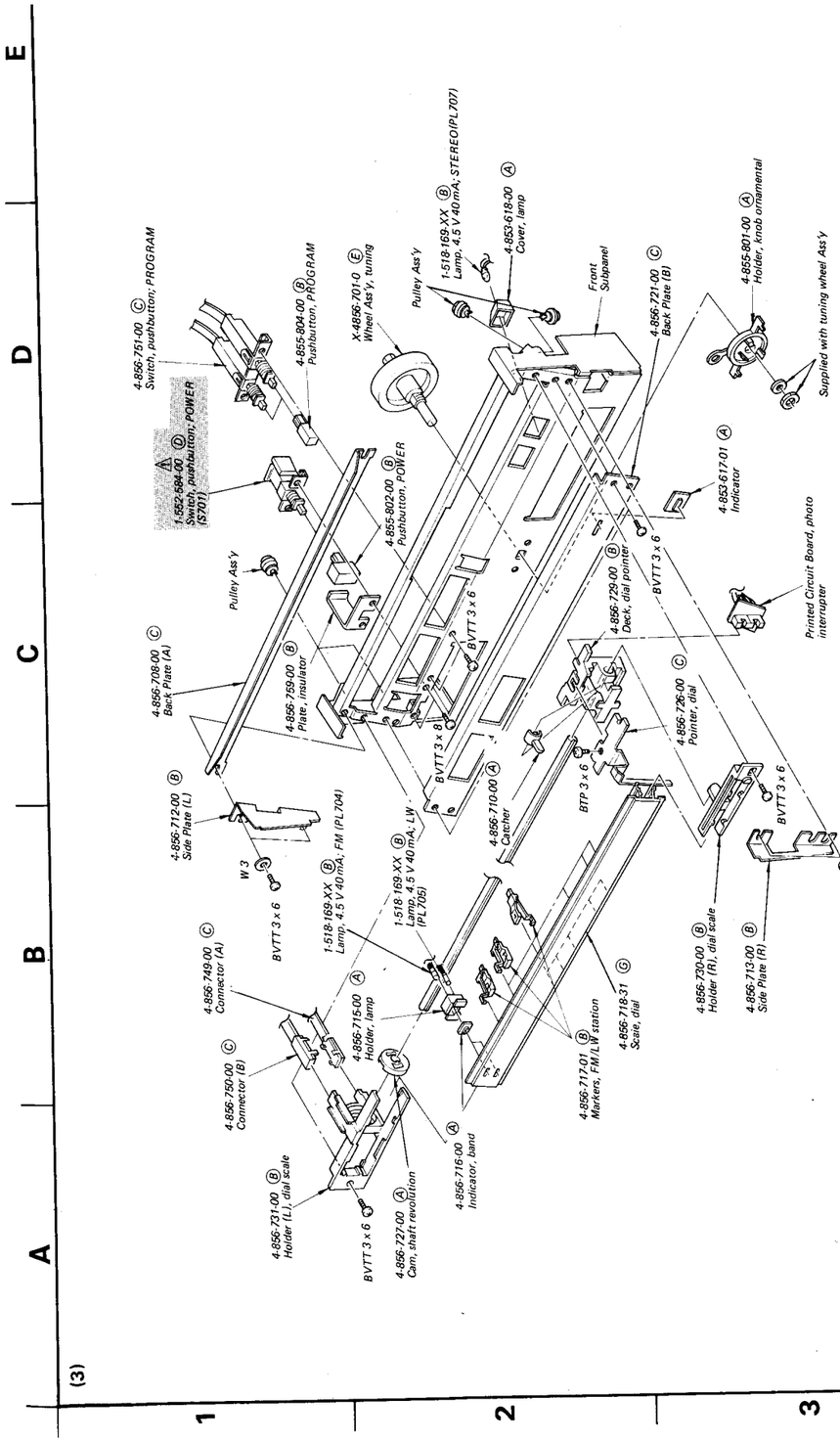

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  (–) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

SECTION 6
ELECTRICAL PARTS LIST

Note: Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*
		SEMICONDUCTORS
		Transistors
⇒ Q201	8-729-663-47	Ⓑ 2SC1364
Q401	8-729-217-33	Ⓒ 2SC1173
⇒ Q501, 502	8-729-663-47	Ⓑ 2SC1364
⇒ Q503, 504	8-727-788-00	Ⓑ 2SA678
⇒ Q505, 506	8-729-663-47	Ⓑ 2SC1364
		ICs
IC201	8-751-680-01	Ⓘ CX168
IC301	8-751-780-00	Ⓖ CX178
IC501, 502	8-719-902-01	Ⓓ SPI201
		Diodes
⇒ D201 ⇒ D301–303	8-719-815-55	Ⓑ 1S1555
D401	⚠8-719-511-10	Ⓒ S1VB10
⇒ D402	8-719-931-16	Ⓑ EQB01-16
⇒ D501–503	8-719-815-55	Ⓑ 1S1555
		COILS
L201	1-407-169-XX	Ⓐ 100 μH, microinductor
L202	1-407-741-00	Ⓑ 18 μH, microinductor
L251	1-405-812-00	Ⓑ SW Osc
L252	1-405-797-00	Ⓑ MW Osc
L253	1-405-813-00	Ⓑ LW Osc
L254	1-401-741-00	Ⓑ SW Ant
L255	1-401-728-00	Ⓑ MW Ant
L256	1-401-709-00	Ⓒ LW EXT Ant
L257	1-407-163-XX	Ⓐ 33 μH, microinductor
L258	1-407-210-XX	Ⓐ 22 mH, microinductor
L260	1-401-747-00	Ⓕ Antenna, built-in ferrite-rod; LW
L261	1-407-178-XX	Ⓐ 1 μH, microinductor
		TRANSFORMERS
IFT201	1-404-011-00	Ⓒ FM discriminator
IFT251	1-404-087-00	Ⓓ AM IFT
PT701	⚠1-446-118-00	Ⓖ Power (AEP model)
PT701	⚠1-446-119-00	Ⓖ Power (UK model)

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Ref. No.	*Part No.*	*Description*		
		CAPACITORS		
All capacitors are in μF and ceramic unless otherwise noted. 50 WV or less are not indicated except for electrolytics. pF = μμF, elect = electrolytic				
C101	1-101-005-11	Ⓐ 0.022		
C102	1-121-415-11	Ⓐ 100	16 V	elect
C201–203	1-101-005-11	Ⓐ 0.022		
C204	1-121-651-11	Ⓐ 10	16 V	elect
C205	1-101-006-11	Ⓐ 0.047		
C206	1-101-925-11	Ⓐ 0.047		
C207	1-121-414-11	Ⓐ 100	10 V	elect
C208, 209	1-101-005-11	Ⓐ 0.022		
C210	1-101-925-11	Ⓐ 0.047		
C211	1-121-352-11	Ⓐ 47	10 V	elect
C212	1-101-925-11	Ⓐ 0.047		
C213	1-121-352-11	Ⓐ 47	10 V	elect
C214	1-121-403-11	Ⓐ 33	10 V	elect
C215	1-102-816-11	Ⓐ 120 p		
C216	1-101-005-11	Ⓐ 0.022		
C217	1-121-392-11	Ⓐ 3.3	25 V	elect
C251	1-101-005-11	Ⓐ 0.022		
C252	1-121-391-11	Ⓐ 1	50 V	elect
C253	1-121-416-11	Ⓑ 10	16 V	elect
C254, 255	1-101-005-11	Ⓐ 0.022		
C256	1-102-973-11	Ⓐ 100 p		
C257	1-121-395-11	Ⓐ 4.7	25 V	elect
C258	1-101-044-11	Ⓐ 0.01		
C259	1-108-355-12	Ⓐ 0.0056		mylar
C260	1-121-726-11	Ⓐ 0.47	50 V	elect
C261	1-108-249-12	Ⓐ 0.068		mylar
C262	1-121-392-11	Ⓐ 3.3	25 V	elect
C263	1-121-409-11	Ⓐ 47	16 V	elect
C264	1-121-392-11	Ⓐ 3.3	25 V	elect
C265	1-101-005-11	Ⓐ 0.022		
C266	1-121-414-11	Ⓐ 100	10 V	elect
C267	1-121-419-11	Ⓐ 220	6.3 V	elect
C268	1-121-395-11	Ⓐ 4.7	25 V	elect

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

Ref. No.	Part No.	Description		
C269	1-101-005-11	(A) 0.022		
C270	1-102-262-11	(A) 12 p		
C271	1-103-739-11	(A) 0.0039		polystyrol
C272	1-102-749-11	(A) 12 p		
C273	1-103-713-11	(A) 330 p		polystyrol
C274	1-101-880-11	(A) 47 p		
C275	1-103-703-11	(A) 120 p		polystyrol
C276	1-102-951-11	(A) 15 p		
C277	1-102-935-11	(A) 2 p		
C278	1-102-118-11	(A) 0.0012		
C279	1-101-005-11	(A) 0.022		
C280	1-108-228-12	(A) 0.0015		mylar
C281	1-108-352-12	(A) 0.0018		mylar
C282	1-102-936-11	(A) 3 p		
C301	1-121-403-11	(A) 33	10 V	elect
C302, 303	1-108-356-12	(A) 0.0022		mylar
C304, 305	1-121-391-11	(A) 1	50 V	elect
C306	1-121-651-11	(A) 10	16 V	elect
C307, 308	1-121-726-11	(A) 0.47	50 V	elect
C309	1-121-651-11	(A) 10	16 V	elect
C310	1-121-415-11	(A) 100	16 V	elect
C311	1-104-081-11	(A) 0.0015		polystyrol
C312	1-121-479-11	(A) 22	16 V	elect
C313	1-121-651-11	(A) 10	16 V	elect
C314	1-121-726-11	(A) 0.47	50 V	elect
C401, 402	⚠1-102-355-11	(A) 0.01×2	500 V	
C403	⚠1-121-388-11	(B) 1000	25 V	elect
C404	1-101-005-11	(A) 0.022		
C405	1-121-409-11	(A) 47	16 V	elect
CT251–256	1-141-179-12	(B) 10 p, trimmer		
CT253	1-141-171-00	(A) 15 p, trimmer		

RESISTORS

All resistors are in ohms. Common ¼ W carbon resistors are omitted. Refer to the list on page 22 for the their part numbers. kΩ = 1000 Ω, MΩ = 1000 kΩ.

R318 R512–514	1-244-860-11	(A) 300	½ W	composition

Note: Circled letters ((A) to (Z)) are applicable to European models only.

Ref. No.	Part No.	Description
RT301	1-224-645-XX	(B) 10 k-B, adjustable; FM separation
RT302	1-224-644-XX	(B) 4.7 k-B, adjustable; VCO
RT303	1-224-647-XX	(B) 47 k-B, adjustable; muting level
		SWITCHES
S1–6	1-552-583-00	(B) Pushbutton, FUNCTION/MODE/MUTING
S8	1-552-233-00	(C) Pushbutton, LW antenna selector
S701	⚠1-552-584-00	(D) Pushbutton, POWER
		MISCELLANEOUS
CF201	1-527-277-91	(G) Filter, ceramic
CNP701	⚠1-534-777-00	(D) Cord, power (UK model)
CNP701	⚠1-534-817-XX	(D) Cord, power (AEP model)
CNP702	1-551-294-00	(E) Cord, with phono plug connection
F401	⚠1-532-273-00	(B) Fuse, T250 mA
ME201	1-520-339-00	(H) Meter, FM TUNING
ME202	1-520-338-00	(H) Meter, SIGNAL strength
PL701	1-518-297-00	(C) Lamp, 8 V 300 mA; meter
PL702, 703	1-518-317-00	(G) Lamp, dial; with reflection plate
PL704	1-518-169-XX	(B) Lamp, 4.5 V 40 mA; FM
PL705	1-518-169-XX	(B) Lamp, 4.5 V 40 mA; LW
PL706	1-518-169-XX	(B) Lamp, 4.5 V 40 mA; PROGRAM SENSOR
PL707	1-518-169-XX	(B) Lamp, 4.5 V 40 mA; STEREO
TM101	1-536-542-00	(C) Terminal Board, ANTENNA
	1-463-248-00	(M) FM Front-end
	⚠1-535-131-00	(A) Holder, fuse
	1-535-132-00	(B) Terminal, ANTENNA ground

ACCESSORIES & PACKING MATERIALS

Part No.	Description
1-501-184-00	(C) Feeder Antenna
3-701-630-00	(A) Bag, plastic (UK model)
3-770-582-11	(C) Manual, instruction
4-855-829-00	(B) Cushion
4-856-760-01	(D) Carton

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

1/4 WATT CARBON RESISTORS (A)

Note: Circled letter (A) is applicable to European models only.

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11	1.0M	1-244-745-11
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11	1.1M	1-244-746-11
1.2	1-244-603-11	12	1-244-627-11	120	1-244-651-11	1.2k	1-244-675-11	12k	1-244-699-11	120k	1-244-723-11	1.2M	1-244-747-11
1.3	1-244-604-11	13	1-244-628-11	130	1-244-652-11	1.3k	1-244-676-11	13k	1-244-700-11	130k	1-244-724-11	1.3M	1-244-748-11
1.5	1-244-605-11	15	1-244-629-11	150	1-244-653-11	1.5k	1-244-677-11	15k	1-244-701-11	150k	1-244-725-11	1.5M	1-244-749-11
1.6	1-244-606-11	16	1-244-630-11	160	1-244-654-11	1.6k	1-244-678-11	16k	1-244-702-11	160k	1-244-726-11	1.6M	1-244-750-11
1.8	1-244-607-11	18	1-244-631-11	180	1-244-655-11	1.8k	1-244-679-11	18k	1-244-703-11	180k	1-244-737-11	1.8M	1-244-751-11
2.0	1-244-608-11	20	1-244-632-11	200	1-244-656-11	2.0k	1-244-680-11	20k	1-244-704-11	200k	1-244-728-11	2.0M	1-244-752-11
2.2	1-244-609-11	22	1-244-633-11	220	1-244-657-11	2.2k	1-244 681-11	22k	1-244-705-11	220k	1-244-729-11	2.2M	1-244-753-11
2.4	1-244-610-11	24	1-244-634-11	240	1-244-658-11	2.4k	1-244-682-11	24k	1-244-706-11	240k	1-244-730-11	2.4M	1-244-754-11
2.7	1-244-611-11	27	1-244-635-11	270	1-244-659-11	2.7k	1-244-683-11	27k	1-244-707-11	270k	1-244-731-11	2.7M	1-244-755-11
3.0	1-244-612-11	30	1-244-636-11	300	1-244-660-11	3.0k	1-244-684-11	30k	1-244-708-11	300k	1-244-732-11	3.0M	1-244-756-11
3.3	1-244-613-11	33	1-244-637-11	330	1-244-661-11	3.3k	1-244-685-11	33k	1-244-709-11	330k	1-244-733-11	3.3M	1-244-757-11
3.6	1-244-614-11	36	1-244-638-11	360	1-244-662-11	3.6k	1-244-686-11	36k	1-244-710-11	360k	1-244-734-11	3.6M	1-244-758-11
3.9	1-244-615-11	39	1-244-639-11	390	1-244-663-11	3.9k	1-244-687-11	39k	1-244-711-11	390k	1-244-735-11	3.9M	1-244-759-11
4.3	1-244-616-11	43	1-244-640-11	430	1-244-664-11	4.3k	1-244-688-11	43k	1-244-712-11	430k	1-244-736-11	4.3M	1-244-760-11
4.7	1-244-617-11	47	1-244-641-11	470	1-244-665-11	4.7k	1-244-689-11	47k	1-244-713-11	470k	1-244-737-11	4.7M	1-244-761-11
5.1	1-244-618-11	51	1-244-642-11	510	1-244-666-11	5.1k	1-244-690-11	51k	1-244-714-11	510k	1-244-738-11	5.1M	1-244-762-11
5.6	1-244-619-11	56	1-244-643-11	560	1-244-667-11	5.6k	1-244-691-11	56k	1-244-715-11	560k	1-244-739-11		
6.2	1-244-620-11	62	1-244-644 11	620	1-244-668-11	6.2k	1-244-692-11	62k	1-244-716-11	620k	1-244-740-11		
6.8	1-244-621-11	68	1-244-645-11	680	1-244-669-11	6.8k	1-244-693-11	68k	1-244-717-11	680k	1-244-741-11		
7.5	1-244-622-11	75	1-244-646-11	750	1-244-670-11	7.5k	1-244-694-11	75k	1-244-718-11	750k	1-244-742-11		
8.2	1-244-623-11	82	1-244-647-11	820	1-244-671-11	8.2k	1-244-695-11	82k	1-244-719-11	820k	1-244-743-11		
9.1	1-244-624-11	91	1-244-648-11	910	1-244-672-11	9.1k	1-244-696-11	91k	1-244-720-11	910k	1-244-744-11		

HARDWARE NOMENCLATURE

Screw: P 3 × 10
- *L: Length in mm*
- *D: Diameter in mm*
- *Type of head*
- *Indicated slotted-head only. Unless otherwise indicated, it means cross-recessed head (Phillips type).*

Nut, Washer, Retaining ring: N 3
- *Diameter of usable screw or shaft*
- *Reference designation*

Reference Designation	Shape	Description	Remarks
		SCREWS	
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazier-head screw	

Reference Designation	Shape	Description	Remarks
		SELF-TAPPING SCREWS	
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
		SET SCREWS	
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
		NUT	
N		nut	
		WASHERS	
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
		RETAINING RINGS	
E		retaining ring	
G		grip-type retaining ring	

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